

Logical Division

THE TREE OF PORPHYRY is an example of a logical technique known as *division*. [Greek *diairesis*; Latin *divisio* or *partitio*.] This mode of concept juggling was brought into prominence by Plato in his later years, though there are hints of it with Socrates, and it subsequently became a permanent part of logic. It is in fact a very useful method for organizing concepts.

In this Note we consider what division is, we look at some examples from Plato, and we consider some of the rules that logicians have laid down about it.

1. What Division Is

Division is a way of coming to understand a concept by locating it within a system of classification. Suppose our concern is with concept F. Division might lead us to start with a very broad concept A, to divide A into B and C, to divide B into D and E and to divide E into F and G. Then we would be able to see how F relates to these other concepts, which might be a very useful intellectual advance. We could sum it up by saying that F is ABD. And we could picture the situation in a diagram, as in Figure 1.

1.1. The Four Elements

There is more to a division, though, than is shown by a diagram such as this. At every step of the division there are *four* elements to be considered, at least theoretically. Consider, for example, dividing the genus TRIANGLE into the species EQUILATERAL, ISOSCELES and SCALENE; this would involve the following elements:

- Identification of **genus** to be divided, in our case, TRIANGLE.
- Identification of the **basis** for division [*fundamentum divisionis*]: This is some general property which it makes sense to apply to all mem-

bers of the genus being divided, and which can come in different modes or forms; it determines the dimension, so to speak, along which we

division we might say something like this:

We divide triangles into three kinds on the basis of the number of equal sides. Those with all three sides equal are equilateral, those with just two sides equal are isosceles, and those with no sides equal are scalene.

In practice, of course, it is not usually necessary to go through the whole rigmarole; there is no need to say what will be obvious to the audience, and one may skip over elements that are not relevant to the purpose for which the division is undertaken. Thus, in this case, the basis of the division is pretty obvious, and needn't be mentioned. And if the ultimate purpose of the division is to locate the concept RIGHT ISOSCELES TRIANGLE, one could skip the reference to EQUILATERAL AND SCALENE. But for a sound division, all the elements must *be* there, even if they are not stated.

1.1.2. Limits of Language

One of the problems in doing a division is that the language may not contain words for some of the things it is necessary to indicate. Plato commented on this:

- **Plato:** (c. 355 BC)¹

Where, then, can the fitting name . . . be found? No doubt it is hard to find one because the ancients, it would seem, suffered from a certain laziness and lack of discrimination with regard to the division of genera according to species, and not one of them tried to make such divisions, with the result that there is a serious shortage of names.

(Plato, *Sophist* 267d)²

What Plato did in such cases, and what we too are forced to do, is twist existing names to serve the purpose,

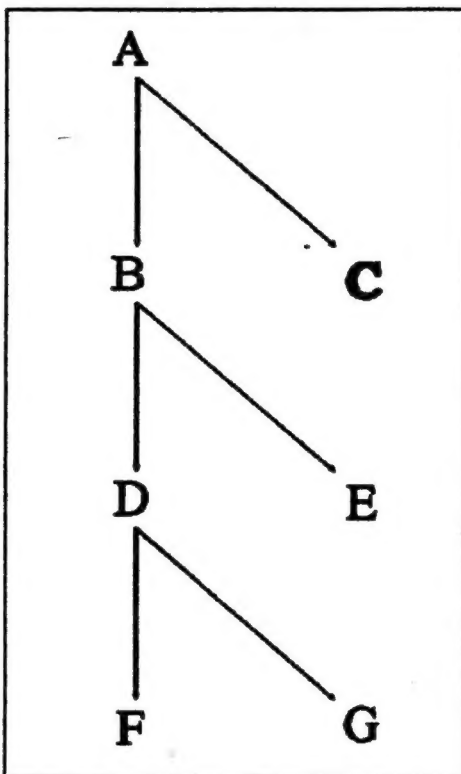


Figure 1

make the division. In our case it would be NUMBER OF EQUAL SIDES, which could be zero, two or three.

- Identification of **differentiae** for the resulting species. These properties are particular forms or modes of the basis for division and, as applied to the genus, they must be mutually exclusive and jointly exhaustive. In our case, ALL THREE SIDES EQUAL, JUST TWO SIDES EQUAL and NO SIDES EQUAL.
- Identification of resulting **species**, in our case, EQUILATERAL, ISOSCELES and SCALENE.

1.1.1. An Example

So to do a complete job on our



Plato

invent new names, or do without names.

2. Plato's Examples

Let us turn now to Plato and his examples. One scholar describes Plato's general idea of division as follows:

• Paul Shorey: (1933)

The method [of division], as exemplified in the *Sophist*, is this: The term to be defined is subsumed under some very large inclusive group, as, for example, the concept of art or science,

and this group or class is successively subdivided by dichotomy, as in Porphyry's logical tree or the game "Animal, Vegetable, or Mineral," until the original term is definitely "located" in the last division.

(Paul Shorey, *What Plato Said*)³

The *Sophist* mentioned here is one of Plato's later *Dialogues*; in it Plato uses the method of division to pin down the concept SOPHIST.

2.1. Sophists and Sophistry

The concept SOPHIST is in itself of considerable interest to Close Rea-

soners, if only because of our words "sophistical", "sophistry" and "sophism", which are based on it.

This is actually rather curious, in a way. The root of all these words is the Greek word *sophos*, meaning wise, and from it we also get such words as "sophisticated" and "philosophy". But all of the logically relevant 'soph' words, "sophistical" and so on, have to do with logical fallacies, which aren't very wise at all. So how come?

Well, the Sophists were professional teachers in ancient Greece in the time of Socrates and Plato who went from town to town offering, for a fee, to teach the young men to be good citizens and to make a success of their lives, and they would do this by giving instruction in disputation and how to win arguments!

The Sophists took special pride in their ability to argue any side of any issue, whether they knew anything about it or not, and whether it was right or wrong; this is the central skill they offered to impart. It was often said that they were teaching how to make the worse side appear to be the better.

Their teaching, they maintained, was wisdom, but in the very influential view of Plato, it was a false wisdom, and he did not approve of it at all; his attitude towards the Sophists can be compared to that of an Anglican bishop towards a Jimmy Swaggart. Plato and the Sophists, not to mention Socrates, were all in roughly the same business, Truth, Knowledge, and Wisdom, but Plato was after the real thing while the Sophists, he felt, were quite content to fake it. Our present day words having to do with logical fallacy reflect Plato's attitude; the central idea is that of *fake wisdom*.

In the *Sophist*, Plato wants to put the Sophists in their place by putting the concept SOPHIST in *its* place. Socrates plays only a minor role in this *Dialogue*; the main talk is between Theatetus, a young lad, and a person identified only as a visitor from Elea. This was a Greek town in Italy, and home of the famous 'Eleatic' school of philosophy in which Plato was quite interested, and which we will have to consider on another occasion. The visitor, or 'Stranger' as the word is usually translated, takes the lead; Theatetus just answers as he is

supposed to. The Stranger, is generally thought to speak for Plato.

2.2. The Angler

Since the technique of division is new, the Stranger first illustrates its use on an easy concept, ANGLING, that is, catching fish with a barbed hook, before going to work on SOPHIST. The result is summarized in the diagram of Figure 2.

He starts with the very broad concept of an ART, that is, a skill, technique or trade. He divides this into ACQUISITIVE ART and PRODUCTIVE ART; in the productive arts things are made, in the acquisitive arts things that already exist are acquired.

He next divides ACQUISITIVE ART into COERCION and EXCHANGE, according to the method of acquisition, force on the one hand, gift or purchase on the other.

COERCION is next divided on the basis of how the force is exercised, secretly or openly. The secret kind is identified with HUNTING, the open with FIGHTING.

The next division is on the basis of whether the thing hunted for is living or not. If it is, we have ANIMAL-HUNTING; there appears to be no general name, in either Greek or English, for the other kind.

ANIMAL-HUNTING is then divided according to whether the animal swims or goes on four feet. This means, according to the Stranger, WATER-ANIMAL-HUNTING on the one hand and LAND-ANIMAL-HUNTING on the other.

(What about the birds? They get included with WATER-ANIMAL-HUNTING, which divides into FISHING and BIRD-HUNTING. It would seem that either quail, pheasant, etc. were not hunted, or else Plato is cutting corners. Maybe it was thought that the birds swim in the air.)

FISHING is then divided on the basis of the method used: with a blow or by

means of nets, traps, etc. This gives us FISHING-BY-STRIKING and FISHING-BY-ENCLOSURE.

The STRIKING kind of FISHING is next divided into two kinds: with the use of barbed implements in daylight, and by firelight. (The implements used in firelight fishing are not named.) This gives us 'BARBING' and 'FIRE-HUNTING'.

BARBING, finally is of two kinds: with a hook, striking upward, hitting mainly the mouth, which is our target concept, ANGLING; and with a spear, striking downward, hitting any part of the fish's body, which is SPEARING.

The Stranger now sums it all up for Theatetus:

• Plato:

STRANGER: Now then, you and I are not only agreed about the name of ANGLING, but we have acquired also a satisfactory definition of the thing itself. For of ART as a whole, half was ACQUISITIVE, and of the ACQUISITIVE, half was COERCIVE, and of the COERCIVE, half was HUNTING, and of HUNTING, half was ANIMAL-HUNTING, and of ANIMAL-HUNTING, half was WATER-ANIMAL-HUNTING; of this again, the under half was FISHING, and of FISHING, half was STRIKING, and of STRIKING, half was BARBING, and of this the part in which the blow is pulled from below upward . . . is called ANGLING, which was the object of our present search.

THEATETUS: That at all events has been made perfectly clear.

STRANGER: Come, then, let us use this as a pattern and try to find out what a sophist is.

(*Sophist* 221b)

2.3. The Sophist

This example is reasonably straightforward, as Plato meant it to be. The division for SOPHIST is more challenging, both logically and philosophically. The Stranger runs through a number of half-serious preliminary attempts at division before coming to his final and definitive one, which we now examine.

We begin as before with ART, for the sophist practices a certain art, and divide it as before into the ACQUISIT-

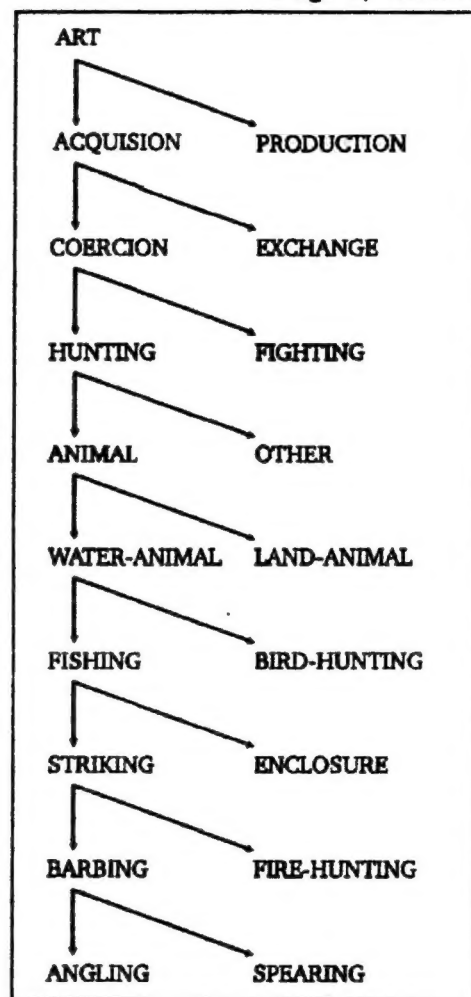


Figure 2

IVE and the PRODUCTIVE. But this time we follow up the PRODUCTIVE side, dividing it into the DIVINE and the HUMAN. Things in nature fall under the DIVINE since they are produced by the gods; on the other side we have the making of things by humans.

2.3.1. Cross-Classification

Rather surprisingly, the next division is according to whether what is produced is a real thing or an image. Since this applies to DIVINE as well as HUMAN PRODUCTION, the Stranger offers what would today be called a cross-classification: DIVINE versus HUMAN, and REAL versus IMAGE. On the DIVINE side we would have the various natural objects as REAL, and shadows and reflections as IMAGES. And on the HUMAN side we would have, say, a house and a painting of a house.

This sort of double division is a useful conceptual tool, and is easily diagrammed in a two by two matrix, as in Figure 3. But it is just complicated



PRODUCTIVE ARTS		
	DIVINE	HUMAN
REAL	Tree	House
IMAGE	Shadow of tree	Painting of house

Figure 3

enough that people sometimes forget one or another of the boxes, and so get into trouble. We will be looking at cases of such forgetfulness in other Notes.

2.3.2. The Problem of Falsehood

Since our present purpose is to pursue the SOPHIST, we are only interested in the HUMAN IMAGE box, which is where he lurks. The next division, which is philosophically the most interesting, divides IMAGES into true images, or LIKENESSES and false images, or FANTASIES.

This seems obvious enough, but it had presented a great problem for Plato, and for philosophers before him, especially Parmenides and Zeno of the Eleatic school; many pages of the *Sophist* are spent working it out.

One aspect of the difficulty can be put this way: a true image is one that shows things as they are, that is to say, *it shows what is*; a false image shows things as they are not, that is to say, *it shows what is not*. But what is not is nothing, hence a false image shows nothing. And an image that shows nothing is not an image, from which it follows that there cannot be any such thing as a false image.

Or a false statement either, for the same reasoning applies to statements and what they say. A false statement *says what is not*, which is nothing. To make a statement is to say something, and you don't do that if you say nothing. We leave the unraveling of this sophistry as an exercise for the Close Reasoner.



2.4. The Sophist Found

Once over this hurdle, and having settled that there can be such things as false images, the Stranger follows up the FANTASY side. The SOPHIST is clearly in the business of FANTASY-MAKING, which is divided into making things with tools, as in painting, and MIMICRY, in which one's own person is used, as in acting.

The MIMICS are then divided according to whether or not they have knowledge of what they are mimicking: MIMICS-BY-ACQUAINTANCE, who know, and MIMICS-BY-CONCEIT, who do not.

The latter are divided into the SIN-CERE, who do not know that they don't know, and the INSINCERE, who do know this.

Finally, the INSINCERE-MIMICS-BY-CONCEIT are divided into those who do it in long speeches to large audiences, the DEMAGOGUES, and those who do it in short speeches before private gatherings, forcing others to contradict themselves; these are the SOPHISTS. (We will look into this business of forcing people to contradict themselves in another Note.)

This is diagrammed in Figure 4. The Stranger uses a genealogical vocabulary to summarize the division:

• Plato:

STRANGER: The art of contradiction making, descended from an Insincere kind of conceited mimicry, of the fantasy-making breed, derived from image making, distinguished as a portion, not divine but human, of production, that presents a shadow play of words—such are the blood and lineage which can, with perfect truth, be assigned to the authentic Sophist.

THEATETUS: I entirely agree.

(*Sophist* 268d)

2.4.1. Diogenes and the Plucked Chicken

Division is indeed a very useful technique, but subsequent thinkers tended to believe that Plato and his school overdid it, a point brought out in this story about Plato and Diogenes the Cynic, told by the ancient biographer Diogenes Laertius:

• Diogenes Laertius: (c. 220 AD)

Plato had defined man as an animal, biped and featherless, and was applauded. Diogenes plucked a chicken and brought it into the lecture-room with the words, "Here is Plato's man." In consequence there was added to the definition "having broad nails".

(Diogenes Laertius, *Lives of the Eminent Philosophers*)⁴

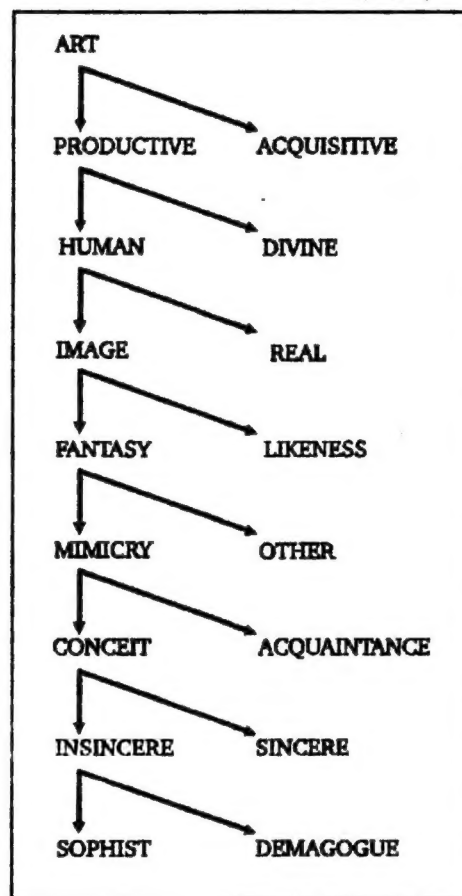


Figure 4

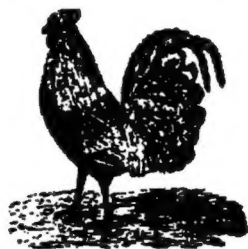
This story, as one might imagine, has been frequently repeated; here is another telling. It is from the first logic book in English, and has a different moral:

• Thomas Wilson: (1551)

When Plato had defined a man, to be a living creature, having two feet, and without feathers, Diogenes that scoffing Dog,⁵ which loved to take advantage, upon small occasion, seeing Plato upon a time, most earnest in teaching his scholars, suddenly chopped into the school, and setting a cock in the midst of

them, which had all his feathers plucked off, behold quoth he, here is Plato his man, whom he has painted out so clerkly [as a scholar] unto you. Because this definition was not plain and open, Diogenes thus jested, as ye have heard. Notwithstanding Plato his saying was true enough, and good enough also, if it had pleased him so to understand it. For Plato his meaning, was of a creature, that by nature lacks feathers, not of one that had his feathers plucked off, and so the definition is without fault.

*The Rule of Reason containing the Arte of Logique*⁶



and feet. A man is divided into body and soul, and this kind of dividing is properly called a partition. And the very difference between a division, and a partition is, that in a division where the general, and the kind are, the general word is spoken of the kind itself, as . . . Justice is a virtue, whereas it cannot be so, when the whole is divided into his parts, that the whole

should be spoken of his part, as I cannot say . . . the head is the man. For the head is not man, nor yet the belly neither, although they both be parts of man. . . .

The substance is divided into his accidents, as thus, of men, some are free, some are bond [slaves].

*(The Rule of Reason, pp. 39-40.)*⁷

We could define the difference this way; the word for the genus applies to the species, but the word for the whole does not apply to the part. Justice is a species of virtue, and it is a virtue; the head is a part of a man, but it is not a man.

More recent writers do not follow Wilson in making a special case of dividing substance into accidents; instead, they include it with dividing the general into its kinds or species. (On the special meaning of "substance" and "accident" here, see a later Note on the 'predicables'.)

3.2. Isaac Watts

Rules, of course, have been provided by most writers who discuss division. The key is always that the species should be mutually exclusive and jointly exhaustive of the genus, but sometimes other points are brought in. Thomas Wilson gives some rules, but they are not very well stated so let us look ahead 200 years to the renowned text book of Isaac Watts. This writer, alas, uses the word "division" to refer to partition, and so has to use the word "distribution" to refer to division proper. It is confusing, but otherwise, he is on track:

• Isaac Watts: (1724)

As an *integral Whole* is distinguished into its several parts by *Division*; so the Word *Distribution* is most properly used when we distinguish an *universal Whole* into its several Kinds or Species: And perhaps it had been better if this Word had been always confined to this Signification, though it must be confessed, that we frequently speak of the *division* of an Idea into its several Kinds, as well as into its several Parts.

I. *Rule.* Each Part *singly* taken must contain less than the Whole, but all the Parts taken *collectively*, or *together*, must contain neither more nor less than the Whole; or, as *Logicians* sometimes express it, *The Parts of the Division ought to exhaust the whole Thing which is divided.* . . .

II. *Rule.* In all *Distributions* we should first consider the larger and more immediate Kinds or Species, or Ranks of Being, and not divide a Thing at once into the more minute and remote. . . .

III. *Rule.* The several Parts of a Distribution ought to be opposite: that is, one Species or Class of Beings in the same Rank of Division, ought not to contain or include another; . . .

IV. *Rule.* Let not Subdivisions be too numerous, without Necessity; . . .

V. *Rule.* Distribute every Subject according to the special Design you have in View, so far as is necessary or useful to your present Inquiry. Thus a *Politician* distributes Mankind according to their civil Characters into the *Rulers* and the *Ruled*; and a *Physician* divides them into the *Sick* and the *Healthy*; but a *Divine* distributes them into *Turks*, *Heathens*, *Jews*, or

3. Rules for Division

3.1. Division and Partition

It is very important in logic to distinguish dividing a genus into its species from dividing a whole into its parts. Some writers reserve the word *division* for the former and use *partition* for the latter. This is a good practice, which we observe here, but many writers do not follow it; indeed, many have been quite muddled about this distinction, and often empty the language of part and whole when they are really talking about species and genus.

Thomas Wilson, however, is on the right side of this issue, and he also points out correctly the key logical difference between division and partition:

• Thomas Wilson:

A division of the thing is three ways considered, for either it is when the general, is divided into the kind, the whole into his parts, or else when the substance, is divided into the accidents. The general is divided into his kind thus, as an element is divided into the fire, the air, the water and the earth. . . .

The whole is divided into his parts, as thus. The body is divided into the head, belly, hands

Christians. . . .

VI. *Rule.* In all your Distributions observe the Nature of Things with great Exactness; and do not affect any particular Form of Distribution, as some persons have done, by dividing *every Genus* into *two Species*, or into *three Species*; whereas Nature is infinitely various, and human Affairs and human Sciences have as great a Variety, nor is there any one Form of Distribution that will exactly suit all Subjects.

(*Logick; or the Right Use of Reason in the Inquiry after Truth*)⁸

Watts also offers a nice comparison to suggest the value of a properly done division:

• **Isaac Watts:**

When this Art [of Logick] teaches us to *distribute* any *extensive* Idea into its different *Kinds* or *Species*, it may be compared to a *prismatic Glass*, that receives the Sun-beams or *Rays of Light*, which seem to be uniform when falling upon it, but separates and distributes them into their different *Kinds* and *Colours*, and ranks them in their proper Succession.

(*Logick*, p. 139.)

3.3. William Minto

In his rules for division, as elsewhere, Watts gives sensible advice, but a sharper statement is to be found in the work of the 19th century Scottish critic and man of letters, William Minto (who, despite his excellent statements on certain logical points, is not important enough to put much effort into remembering):

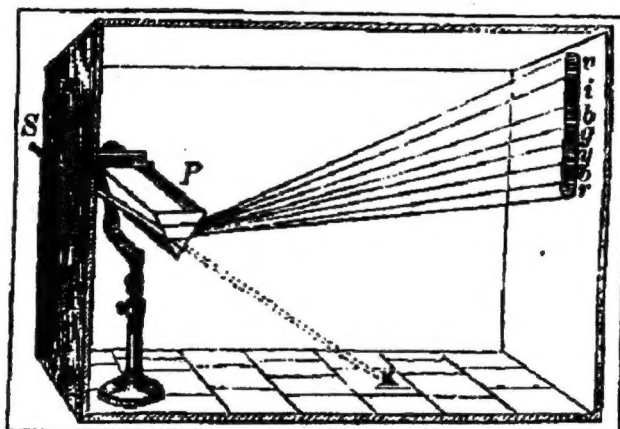
• **William Minto: (1893)**

I. Every division is made on the ground of differences in some attribute common to all the members of the whole to be divided.

II. In a perfect division, the sub-

divisions or species are mutually exclusive.

III. The classes in any scheme of division should be of co-ordinate rank.



IV. The basis of division (*Fundamentum divisionis*) should be an attribute admitting of important differences.

(*Logic, Inductive and Deductive*)⁹

Minto, we see, neglects to mention the requirement that the species should jointly exhaust the genus—perhaps that goes without saying. ■

NOTES

1. The exact dates of Plato's *Dialogues* are not known. For this guess see I. M. Crombie, *An Examination of Plato's Doctrines*, volume I (New York: Humanities Press, 1962), p. 11.
2. Translation based on those of F. M. Cornford, *Plato's Theory of Knowledge* (London: Routledge & Kegan Paul, 1957, first printed 1935), and that of Harold North Fowler in the Loeb edition (London: William Heinemann, 1967, first printed 1921).
3. Paul Shorey, *What Plato Said* (Chicago: University of Chicago Press, 1933), p. 294.
4. Bk. VI, 40. Translation based on that of R. D. Hicks in the Loeb edition (London: William Heinemann, 1958), p. 43.

Diogenes the Cynic, sometimes known as Diogenes of Sinope (412-323 BC), was founder of the Cynic school of philosophy. This is the Diogenes who is said to have lived in a tub, and to have gone around with a lantern in daylight, looking for an honest man.

Diogenes Laertius, who is known only as the author of this collection of gossip Greek biographies of the ancient philosophers, lived about 500 years later; no one

knows where, or exactly when, but scholars generally put him in the 3rd century AD.

5. The Cynic philosophy expounded by Diogenes recommended living according to Nature rather than artificial human conventions, which led sometimes to bizarre behavior. Opponents charged that this meant living like a dog rather than like a human, hence the name, for "Cynic" is based on the Greek word for dog.

6. Edited by Richard Sprague (Northridge, California: San Fernando Valley State College, 1972), p. 38. The spelling has been modernized.

7. Pp. 39-40.

8. (London: 1775), pp. 128-131. This book was first published in 1724, and was widely used in the universities in the 18th century.

9. (London, 1899), pp. 94-97. Minto (1845-1893) finished the book in 1893, but died before its publication. He was Professor of Logic and English at the University of Aberdeen in Scotland.

PICTURE

The picture of Plato is from a bust in the Vatican. It is one of a group of surviving portrait sculptures that all derive from the same original statue—which was perhaps the one set up in Plato's own school, the Academy, and which in any event was probably made sometime towards the end of Plato's life, or shortly afterwards. These busts are known to be of Plato because one of them with Plato's name on it, rather battered, was discovered in 1884 when it was purchased by a certain Count Tyskiewicz at an auction in Naples, and given to the Staatlichen Museen in Berlin; this put an end to all the disputes about what Plato might have looked like. (See *The Portraits of the Greeks* by Gisela M. A. Richter, volume 2, pp. 164-7, and Figure 910.)



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